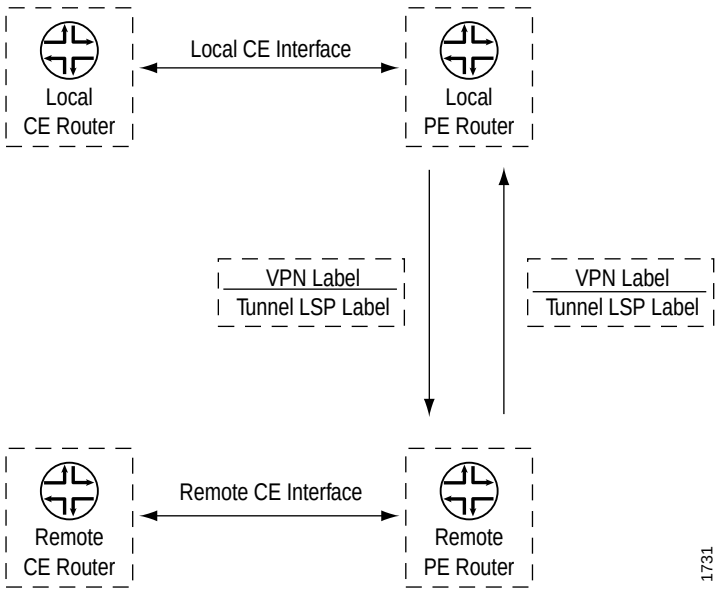
Chapter 16

Layer 2 Virtual Circuits Configuration Guidelines

A Layer 2 circuit is a point-to-point Layer 2 connection transported by means of Multiprotocol Label Switching (MPLS) or another tunneling technology on the service provider's network. A Layer 2 circuit is similar to a circuit cross-connect (CCC) except that multiple Layer 2 circuits can be transported over a single label-switched path (LSP) tunnel between two provider edge (PE) routers. In contrast, each CCC requires a dedicated LSP.

The JUNOS implementation of Layer 2 virtual circuits supports only the remote form of a Layer 2 circuit; that is, a connection from a local customer edge (CE) router to a remote CE router. Figure 43 illustrates the components of a Layer 2 virtual circuit.

Figure 43: Components of a Layer 2 Virtual Circuit



The interfaces shown in Figure 43 are logical interfaces. Packets are sent to the remote CE router using an egress VPN label advertised by the remote PE router. The VPN label transits over an RSVP and LDP LSP (or other type) tunnel to the remote PE router connected to the remote CE router. Return traffic sent from the remote CE router to the local CE router uses an ingress VPN label advertised by the local PE router, which again transits over an RSVP and LDP LSP to the local PE router from the remote PE router. LDP is the signaling protocol used for advertising VPN labels.

Layer 2 Circuit Configuration

To configure a Layer 2 circuit, include statements at the [edit protocols l2circuit] hierarchy level:

```
[edit]
protocols {
    l2circuit {
        neighbor address {
            interface interface-name {
                virtual-circuit-id identifier;
            }
        }
    traceoptions {
        file filename <replace> <size size> <files number> <nostamp>;
        flag flag <flag-modifier> <disable>;
    }
}
```

The following sections describe how to configure Layer 2 virtual circuits:

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Configure the Virtual Circuit ID on page 308

Configure the Interface Encapsulation Type on page 309

Configure LDP for Layer 2 Circuits on page 309

Trace Layer 2 Circuit Creation and Changes on page 309

Configure the Neighbor and Interface

Each Layer 2 circuit is represented by the logical interface connecting the local PE router to the local CE router. All the Layer 2 circuits using a particular remote PE router designated for remote CE routers are listed under the neighbor statement (neighbor designates the PE router). Each neighbor is identified by its IP address and is usually the end-point destination for the LSP tunnel transporting the Layer 2 circuit.

Configure the Virtual Circuit ID

You configure a virtual circuit ID on each interface. Each virtual circuit ID uniquely identifies the Layer 2 circuit among all the Layer 2 circuits to a specific neighbor. The key to identifying a particular Layer 2 circuit on a PE router is the neighbor address and the virtual circuit ID. An LDP-FEC-to-label binding is associated with a Layer 2 circuit based on the virtual circuit ID in the Forwarding Equivalence Class (FEC) and the neighbor that sent this binding. It enables the dissemination of the VPN label used for sending traffic on that Layer 2 circuit to the remote CE router.

Configure the virtual circuit ID at the [edit protocols l2circuit neighbor *address* interface *interface-name*] hierarchy level:

```
[edit protocols l2circuit neighbor address interface interface-name]
virtual-circuit-id identifier;
```

Configure the Interface Encapsulation Type

Both ends of a Layer 2 circuit must connect using the same Layer 2 encapsulation. The Layer 2 encapsulation type is carried in the LDP FEC. The encapsulation type received from an FEC is matched against the local encapsulation type of the Layer 2 circuit. The Layer 2 circuit will not work if the encapsulation types do not match.

The configuration for the encapsulation type on Layer 2 virtual circuits is identical to the configuration for the CCC encapsulation type. For more information, see the *JUNOS Internet Software Configur ation Guide: MPLS Applications* .

To configure the interface encapsulation for a Layer 2 circuit, include statements at the [edit interfaces] hierarchy level:

```
[edit]
interfaces {
    interface-name {
        encapsulation encapsulation-type;
        unit unit-number;
    }
}
```

Configure LDP for Layer 2 Circuits

Use LDP as the signaling protocol to advertise ingress labels to the remote PE routers. When configured, LDP examines the Layer 2 circuit configuration and initiates extended neighbor discovery for all the Layer 2 circuit neighbors (for example, remote PEs). This is similar to how LDP works when tunneled over RSVP. You must run LDP on the lo0.0 interface for extended neighbor discovery to function correctly.

For detailed information about how to configure LDP, see the *JUNOS Internet Softw are Configur ation Guide: MPLS Applications* .

Trace Layer 2 Circuit Creation and Changes

To trace the creation of and changes to Layer 2 virtual circuits, you can specify options in the traceoptions statement at the [edit protocols l2circuit] hierarchy level:

```
[edit protocols l2circuit]
traceoptions {
    file filename <replace> <size size> <files number> <nostamp>;
    flag flag <flag-modifier> <disable>;
}
```

The following tracing flags display the operations associated with Layer 2 virtual circuits:

connections—Layer 2 circuit connections (events and state changes)

error—Error conditions

FEC—Layer 2 circuit advertisements received or sent using LDP

topology—Layer 2 circuit topology changes caused by reconfiguration or advertisements received from other PE routers